

1. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a spacer comprising a pair of spacer segments adapted to contact the substrate; and

5 a cover slip comprising

a surface, and

two substantially parallel, opposed edges bounding the surface,

10 each of the pair of spacer segments extending along substantially a full length of a different one of the opposed edges and forming a chamber between the spacer segments, the cover slip and the substrate, the chamber adapted to contain the specimen when the cover slip is placed on the substrate with the spacer sandwiched therebetween, and

15 a thickness providing a cover slip beam stiffness permitting the cover slip to maintain a substantially constant distance between the surface and the substrate when the liquid is introduced between the cover slip and the substrate.

2. The apparatus of claim 1 wherein the cover slip is glass and the
20 thickness is in a range of about 0.3-2.0 mm.

3. The apparatus of claim 2 wherein the thickness of the cover slip is in a range of about 0.3-1.2 mm.

4. The apparatus of claim 1 wherein the spacer is affixed to the cover slip.

5. An apparatus of the type providing a chamber for containing a specimen on a substrate comprising:

a substrate comprising a surface adapted to support a specimen;

a spacer comprising a pair of spacer segments adapted to contact

5 the substrate; and

a cover slip comprising

a surface, and

two substantially parallel, opposed edges bounding the

surface,

10 each of the pair of spacer segments extending along substantially a full length of a different one of the opposed edges and forming a chamber between the spacer segments, the cover slip and the substrate, the chamber adapted to contain the specimen when the cover slip is placed on the substrate with the spacer sandwiched therebetween,

15 and

a thickness providing a cover slip beam stiffness permitting the cover slip to maintain a substantially constant distance between the surface and the substrate when the liquid is introduced between the cover slip and the substrate.

6. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a spacer comprising a pair of spacer segments adapted to contact the substrate; and

5 a cover slip comprising

a surface, and

two substantially parallel, opposed edges bounding the surface,

10 each of the pair of spacer segments extending along substantially a full length of a different one of the opposed edges and forming a chamber between the spacer segments, the cover slip and the substrate, the chamber adapted to contain the specimen when the cover slip is placed on the substrate with the spacer sandwiched therebetween, and

15 a thickness sufficient to react adhesion forces resulting from the liquid being introduced between the cover slip and the substrate without substantially displacing the liquid from over the specimen.

7. An apparatus of the type providing a chamber containing a specimen on a substrate comprising:

a substrate comprising a surface adapted to support a specimen;

a spacer comprising a pair of spacer segments adapted to contact

5 the substrate; and

a cover slip comprising

a surface, and

two substantially parallel, opposed edges bounding the surface,

10 each of the pair of spacer segments extending along substantially a full length of a different one of the opposed edges and forming a chamber between the spacer segments, the cover slip and the substrate, the chamber adapted to contain the specimen when the cover slip is placed on the substrate with the spacer sandwiched therebetween,

15 and

a thickness sufficient to react adhesion forces resulting from the liquid being introduced between the cover slip and the substrate without substantially displacing the liquid from over the specimen.

8. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:
- a cover slip having a perimeter bounding a surface; and
 - a spacer contacting the surface and adapted to contact the
- 5 substrate when the cover slip is placed on the substrate with the spacer sandwiched therebetween, the spacer located adjacent to and extending along substantially a full length of the perimeter of the cover slip and having discontinuities forming two channels through the spacer, the spacer determining a distance between the cover slip and the substrate when the cover slip is
- 10 placed on the substrate with the spacer therebetween.

9. The apparatus of claim 8 wherein the cover slip has two opposed sides with each opposed side having opposite ends, and each of the two channels is located adjacent a different one of the two opposed sides of the cover slip.

5 10. The apparatus of claim 9 wherein each of the two channels is adjacent an end of a different one of the two opposed sides.

11. The apparatus of claim 9 wherein each of the two channels is intermediate opposite ends of a different one of the two opposed sides.

10 12. The apparatus of claim 8 wherein the cover slip has two adjacent sides and the two channels are located proximate different adjacent sides of the cover slip.

13. The apparatus of claim 12 wherein each of the two channels is proximate an end of a different one of the two adjacent sides.

15 14. The apparatus of claim 8 wherein the cover slip has a side with opposite ends and each of the two channels is adjacent a different end of the side.

15. The apparatus of claim 8 wherein the cover slip has sides that form two diagonally opposed corners and each of the two channels is located at a different one of the two diagonally opposed corners.

20 16. The apparatus of claim 8 wherein the discontinuities in the spacer form four channels through the spacer,

17. The apparatus of claim 16 wherein the cover slip has four intersecting sides that form four corners and each of the four channels is located at a different one of the four corners.

18. The apparatus of claim 17 wherein the cover slip has four sides, each having opposite ends, and each channel of the four channels is intermediate the opposite ends of a different one of the sides of the cover slip.

19. The apparatus of claim 17 wherein the cover slip has two opposed
5 sides and the four channels comprise two pair of channels, each pair of channels being located on a different opposed side of the cover slip.

20. The apparatus of claim 19 wherein each channel is adjacent a different end of a different one of the two opposed sides.

21. The apparatus of claim 8 wherein the cover slip has a thickness in
10 a range of about 0.2-2.0 mm.

22. The apparatus of claim 8 wherein the spacer is affixed to the cover slip.

23. The apparatus of claim 8 wherein the spacer is printed on the cover slip

15 24. The apparatus of claim 8 wherein the substrate comprises a specimen slide and the spacer is affixed to the specimen slide.

25. The apparatus of claim 8 further comprising a second spacer disposed inside a perimeter of the spacer and in a contacting relationship with the cover slip and the substrate.

26. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a first spacer comprising a pair of spacer segments adapted to contact the substrate; and

5 a cover slip comprising

a surface, and

two substantially parallel, opposed edges bounding the surface,

each of the pair of spacer segments extending along
10 substantially a full length of a different one of the opposed edges and forming a chamber between the spacer segments, the cover slip and the substrate, the chamber adapted to contain the specimen when the cover slip is placed on the substrate with the spacer sandwiched therebetween;
and

15 a second spacer disposed between the pair of spacer segments and in a contacting relationship with the cover slip and the substrate.

27. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

20 a substrate having a surface adapted to support a specimen;

a cover slip having a surface bounded by a perimeter; and

a spacer disposed between the surface of the substrate and the surface of the cover slip and forming the chamber between the cover slip and the substrate, the spacer located adjacent to and extending along substantially a full length of the perimeter of the cover slip and having discontinuities forming
25 two channels through the spacer, the spacer determining a distance between the cover slip and the substrate.

28. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a cover slip having a perimeter bounding a surface; and

- 5 a spacer contacting the surface and adapted to contact the substrate when the cover slip is placed on the substrate with the spacer sandwiched therebetween, the spacer extending along the whole perimeter of the cover slip, the spacer determining a distance between the cover slip and the substrate and defining a single, substantially multilateral chamber between the cover slip and the substrate for containing the liquid and specimen when the
- 10 cover slip is placed on the substrate with the spacer sandwiched therebetween.

29. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a cover slip having a perimeter bounding a surface;

- 15 a spacer contacting the surface and adapted to contact the substrate and determining a distance between the cover slip and the substrate; and

a cavity disposed in the surface of the cover slip and adapted to receive the liquid when the cover slip is placed on the substrate with the spacer sandwiched therebetween.

30. An apparatus of the type used to contain a liquid over a specimen on a substrate comprising:

a cover slip having a perimeter bounding a surface; and

5 a spacer contacting the surface and adapted to contact the substrate when the cover slip is placed on the substrate with the spacer sandwiched therebetween, the spacer located adjacent to and extending along substantially a full length of the perimeter of the cover slip and having discontinuities forming a plurality of spaces through the spacer, one of the spaces forming a channel having a size permitting an introduction of a fluid
10 therethrough and other of the spaces having a size inhibiting a flow of the liquid therethrough, and the spacer determining a distance between the cover slip and the substrate when the cover slip is placed on the substrate with the spacer therebetween.

31. An apparatus of the type used to contain a liquid over a specimen
15 on a substrate comprising:

a cover slip having four edges bounding a surface; and

a spacer contacting the surface and adapted to contact the substrate when the cover slip is placed on the substrate with the spacer sandwiched therebetween, the spacer extending adjacent to and along
20 substantially a full length of three of the four edges,

the spacer forming an opening across the perimeter along a fourth of the four edges, whereby the spacer maintains a substantially constant distance between the cover slip and the substrate and defines a space between the cover slip and the substrate for containing the liquid and specimen when the
25 cover slip is placed on the substrate with the spacer sandwiched therebetween.

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providing a substrate having a specimen on a surface thereof;
affixing a spacer to a cover slip having a perimeter;

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capillary action; and

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33. A method of preparing a reaction chamber of the type for use in molecular searches comprising:

providing a substrate having a specimen on a surface thereof;
affixing a spacer to a cover slip having a perimeter;

5 placing the cover slip with the spacer on the surface of the substrate with the spacer sandwiched therebetween to form a chamber between the cover slip and the substrate and around the specimen, the spacer extending substantially over a full length of the perimeter and having discontinuities forming spaced apart first and second channels that extend through the spacer and
10 communicate with the chamber;

depositing a liquid on the substrate adjacent the first channel;
introducing the liquid through the first channel into the chamber via capillary action; and

15 reacting adhesion forces of the liquid in the chamber with the cover slip without substantially displacing the hybridization solution from over the specimen.

34. A method of preparing a reaction chamber of the type for use in molecular searches comprising:

providing a substrate having a specimen on a surface thereof;
affixing a spacer to a cover slip having a perimeter, the spacer

5 extending substantially over a full length of the perimeter and having discontinuities forming two spaced apart channels that extend through the spacer and communicate with the chamber; and

placing the cover slip with the spacer on the surface of the substrate with the spacer sandwiched therebetween to form a chamber between
10 the cover slip and the substrate and around the specimen.

35. The method of claim 34 wherein the perimeter of the cover slip has two opposed corners and the method further comprises affixing a spacer to the cover slip having discontinuities forming two channels that extend through the spacer and communicate with the chamber, each of the two channels being
15 located at a different one of the two corners.

36. The method of claim 34 wherein the perimeter of the cover slip has two opposed sides, each side having opposing ends and the method further comprises affixing a spacer to the cover slip having discontinuities forming two channels that extend through the spacer and communicate with the chamber,
20 each of the two channels being located intermediate the opposing ends of a different one of the two opposing sides.

37. The method of claim 34 further comprising affixing a spacer to the cover slip having discontinuities forming four spaced apart channels that extend through the spacer and communicate with the chamber.

38. The method of claim 34 wherein the perimeter of the cover slip has four sides intersecting at four corners and the method further comprises affixing a spacer to the cover slip having discontinuities forming four channels that extend through the spacer and communicate with the chamber, each of the four channels being located at a different one of the four corners.

39. The method of claim 34 wherein the perimeter of the cover slip has four sides, each side having opposing ends, and the method further comprises affixing a spacer to the cover slip having discontinuities forming four channels that extend through the spacer and communicate with the chamber, each of the channels being located intermediate the opposing ends of a different one of the four sides.

40. The method of claim 34 wherein the cover slip has a thickness in a range of about 0.2-2.0 mm.

41. A method of forming a reaction chamber of the type for use in molecular searches comprising:
- providing a substrate having a specimen on a surface thereof;
 - affixing a spacer to a cover slip having a perimeter, the spacer
- 5 extending along the whole perimeter of the cover slip without any discontinuities through which a liquid can pass; and
- placing the cover slip with the spacer on the surface of the substrate with the spacer sandwiched therebetween to form a chamber between the cover slip and the substrate and around the specimen.
- 10 42. A method of forming a reaction chamber of the type for use in molecular searches comprising:
- providing a substrate having a specimen on a surface thereof;
 - affixing a spacer to a cover slip having a perimeter, the spacer
- 15 extending along the whole perimeter of the cover slip without any discontinuities through which a hybridization fluid can pass;
- orienting the cover slip with the spacer extending upward from the cover slip;
 - introducing a liquid onto the cover slip inside the spacer;
 - placing the substrate on the cover slip with the spacer sandwiched
- 20 therebetween to form a chamber around the specimen between the cover slip and the substrate; and
- orienting the cover slip and substrate so that the cover slip is over the substrate.